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U. S. Department of Agriculture

TEN YEARS OF OIL BURNER RESEARCH

A radio interview between Morse Salisbury, Chief of Radio Service, and Arthur H. Senner, Bureau of Agricultural Engineering, delivered during the Department of Agriculture period of the National Farm and Home Hour Monday, April 19, 1937, and broadcast by a network of 61 associated National Broadcasting Company radio stations.

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SALISBURY:

Mr. Senner, I understand that you recently completed for the Bureau of Agricultural Engineering a major revision of its publication dealing with the automatic oil burner for house heating. Two years ago, you told us some of the facts you had found about oil heating. But not all of us will remember your account of the history of your research, so maybe you'll review it for us again.

SENNER:

Gladly, Mr. Salisbury -- some fifteen years ago, the Federal Bureau of Home Economics received inquiries indicating a generally increasing interest in the use of automatic oil burners for home heating. To meet the demand for reliable information, the agricultural engineers, in cooperation with the home economists tested a number of oil burners of different designs and issued two publications -- one technical and the other non-technical.

Early in our study it became apparent that some of the conventional ideas regarding combustion did not hold true in the burning of oil in the small domestic furnaces, and we decided to find the facts. In 1927 the research work moved into the laboratories of the engineering departments of the Johns Hopkins University, which has since cooperated in the investigations. The extensive laboratory work back of the recent revision of our publication that you referred to has only recently been completed in the laboratory of the Johns Hopkins Engineering School.

SALISBURY:

Thanks for the history, Mr. Senner. Now, we'll appreciate your telling us what is the objective of the Department of Agriculture's publication on the domestic oil burner?

SENNER:

Well, in order to answer this let me quote directly from the bulletin. "To meet the demand of prospective purchasers of this type of equipment for reliable information, the U. S. Department of Agriculture has tested a number of oil burners of different design and has prepared this circular, based on the results of the tests, in which an attempt has been made to give the information necessary for the home owner to make his own selection." (End of quote) Thus, we can take care of the many inquiries which come into the Government.

SALISBURY:

Of course we don't want to give the impression, Mr. Senner, that you recommend specific burners or products to those seeking information.

(over)

SENNER:

Emphatically no. It is not within the Department's province to recommend specific products. Our publication presents general information which should be helpful to anyone purchasing an automatic oil burner.

SALISBURY:

Now confidentially, Mr. Senner, between you and me, which is the best oil burner? (Now all you listeners out there put your fingers in your ears for just a half a minute.)

SENNER:

Joking aside -- there is no best oil burner any more than there is a best automobile. Unfortunately most people who want information on domestic oil burners look only to the mechanical details -- they take hardly any interest in the organization which is behind the product. This is a serious mistake. When purchasing an oil burner the prospective buyer should bear in mind that he is, or should be, purchasing automatic heat, that is he should take into consideration the ability of the selling organization to make a good workmanlike job and provide efficient service. The company should be stable and one likely to remain in business for some time.

SALISBURY:

Very sage advice. Well, then we'll turn to general principles. What kinds of oil do the modern domestic oil burners consume?

SENNER:

The domestic oil burner fuels are distillates of crude petroleum. They are known commercially as domestic fuel oils Numbers 1, 2, and 3. The National Bureau of Standards in cooperation with refiners and other interested individuals has done a creditable job in establishing specifications for domestic oil burner fuels and has issued a publication on Commercial Standards For Fuel Oils.

SALISBURY:

Another point, Mr. Senner. In the automobile and other industries the number of manufacturers has steadily decreased. Is it the same with oil burners?

SENNER:

Hardly -- there are hundreds of manufacturers of domestic oil burners. Many of their products are entire strangers to me although I have been in close touch with the industry for 12 years. Now in spite of the fact that there are large numbers of burner products, you can broadly classify all of them into two principal categories -- the vaporizing and the atomizing classes. But of course there are quite a few types in each of these classes.

SALISBURY:

That leads me to ask, can you predict the ultimate type of burner? That is, which type will survive competition to the possible exclusion of all others?

SENNER:

Oh, oh. That old question. All the time, we're asked to give an opinion as to which burners will become obsolete and which will gain in relative usage and importance. Our answer always is that with the supply of relatively light fuels which will probably exist for some years to come, we should find examples of all of the present important types of burners on the market for an indefinite period. However, more and more manufacturers are going to the so-called gun burner, because it is simple, easy to design and manufacture, and relatively free from patent complications.

SALISBURY:

Here's one that many people are asking, no doubt: Can oil burners be applied to warm air heating systems?

SENNER:

I know many people want to know that. Warm-air furnaces represent a large percentage of the heating plants of this country. Perhaps the principal difficulty to be overcome with old furnaces is the leakage of the products of combustion -- gas and soot -- through the joints of a cast-iron fire pot into the warm-air space of the furnace and thence into the rooms of the house. This condition may be worse with an oil burner than with the ordinary coal-fired furnace. As a rule, an oil burner either is operating at its maximum capacity or is not operating at all. The alternate heating and cooling has a tendency to loosen the seams of the fire pot and permit gases to pass into the warm-air passages. To avoid this difficulty some oil-burner dealers insist that before the burner is installed the outer casing of the furnace be removed and the inner fire pot sections be thoroughly inspected for the purpose of locating leaks, which then are closed in suitable manner before the outer shell is replaced. High-grade steel furnaces with welded joints satisfactorily resist the effects of the high temperatures of the oil burner flame. Modern air-conditioning units are frequently of the warm-air type. Such units are usually so designed as to prevent leakage of products of combustion into the room. In the special oil burner types of warm-air units the efficiencies are as high as those of the hot-water, steam, or vapor heating systems.

SALISBURY:

I am hearing a great deal of talk lately about special boilers for oil burners -- have you given these any study?

SENNER:

Yes, we have. As you say, many new boilers designed primarily for oil or gas firing, made both of steel and of cast iron, have appeared on the market during the past several years. Most of these have been well engineered and show good operating characteristics and good appearance through use of attractive jackets. They frequently have coils for domestic water heating built into them and some even store the domestic water supply within the boiler, thereby making it unnecessary to have a separate storage tank. Again, it is only a short step from the special boiler for oil burning to the so-called boiler-burner unit. The boiler-burner unit consists of a special oil burning boiler of either steel or cast iron, fitted with an oil burner. The units are designed to provide maximum efficiency. A coil for domestic water heating is generally built into the

unit. These units that we have tested have proved very efficient. Generally the efficiency of the boiler-burner unit should be sufficiently higher than those of the average coal-burning boiler when used for oil burning to obtain a fuel saving of from 15 to 20 percent.

SALISBURY:

Almost everyone is naturally interested in the cost of this type of automatic heating -- and of course your bulletin covers this subject.

SENNER:

Well, in a general way. We cannot give specific figures which will cover all cases; but there are general conditions which should always be taken into consideration. For instance, interest and depreciation on the burner installation cost must be included with the cost of heating with oil and for a small installation this charge may equal a considerable portion of the heating cost. The cost of auxiliary power -- electricity, gas, or both -- may be \$1.00 or more per month; the amount varies greatly with burner type and utility price. Also, after the free service period which generally lasts one year, service must be reckoned with, unless service is included in the price of the oil. It can be said however with a burner properly installed, service charges should be small.

SALISBURY:

Aren't other types of fuels than oils used in connection with automatic house heating?

SENNER:

Of course. Gas, for instance. And coal of both the hard and soft varieties is being burned successfully in automatic house heating systems -- in recent years there has been a sharp increase in the number of automatic stoker installations.

SALISBURY:

Well, when you study the machinery for use with these other types of fuel, we hope you'll report to us again. Meantime, those of our listeners who want your printed report on oil burners may get it by sending a card to the United States Department of Agriculture, Washington, D. C. Ask for Circular 406, entitled "Oil Burners for Home Heating."
